Two Triggers and A Tester

Over the years, we have been repeatedly impressed with the ingenuity and resourcefulness of our readers. Whether it's a better or easier way to get the job done, or a homemade tool that's "not available in any store," it's obvious that there are folks out there with their thinking caps on.

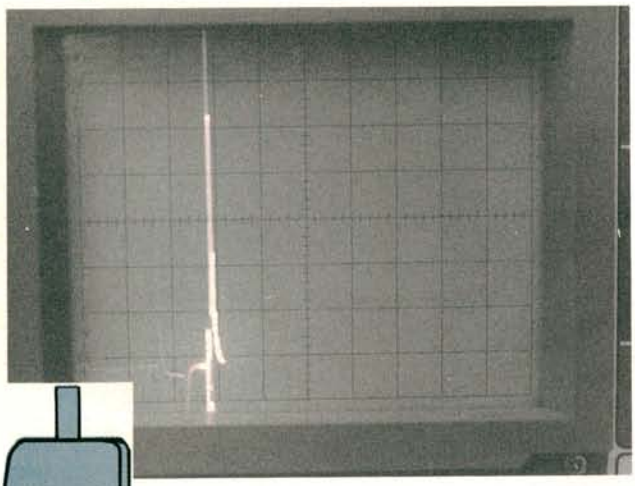
We share many of these ideas with the rest of our readers through the monthly Tech Tips department. However, from time to time we receive a helpful idea that's a little too complicated to adequately summarize in the two page Tech Tips format.

Rather than penalize the inventors for the complexity of their ideas, this month we're giving three such inventors the extra room and photography that's necessary to do their ideas justice. Our three inventors and their inventions are:

- Wayne Barricklow describes how to combine an inductive RPM pickup with the external trigger terminal on your lab scope to synch the scope display. Synching the signal can be especially useful when reading RPM related engine control signals.
- Joe Lash shows us how to build a portable ignition system that can be used when it's necessary to start a car that has a disabled ignition system.
- Chris Cross demonstrates how to build a transistorized switching device. The switching device can be combined with a logic pulser to trigger high current draw electrical components like fuel injectors.

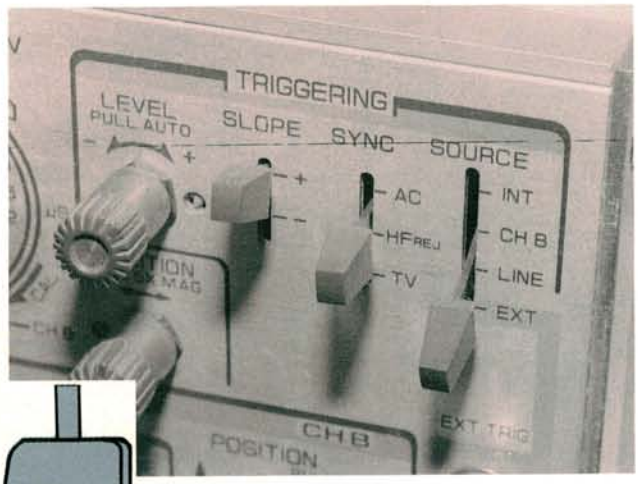
Two Triggers and A Tester

Scope Synching with Wayne



1

If you've used a large ignition oscilloscope, you've probably noticed how the secondary ignition patterns from all of the cylinders always stay on the screen, regardless of the engine speed. That's because the scope display has been synchronized to the engine RPM, using an inductive lead attached to the number one spark plug wire. Measuring RPM related signals with a lab scope that isn't synchronized to the engine RPM can be frustrating. The signals keep waltzing around on the screen, making them very difficult to analyze.



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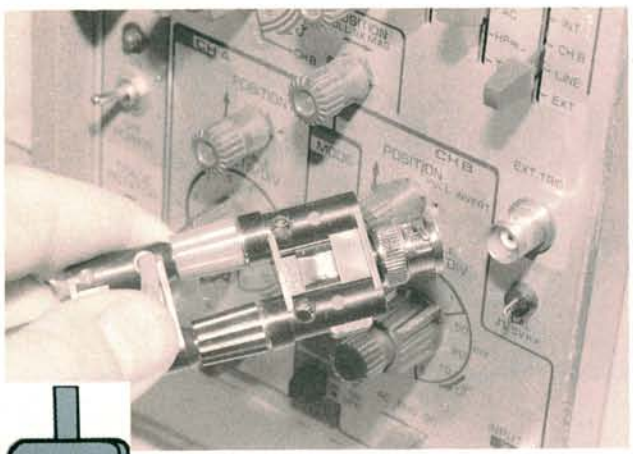
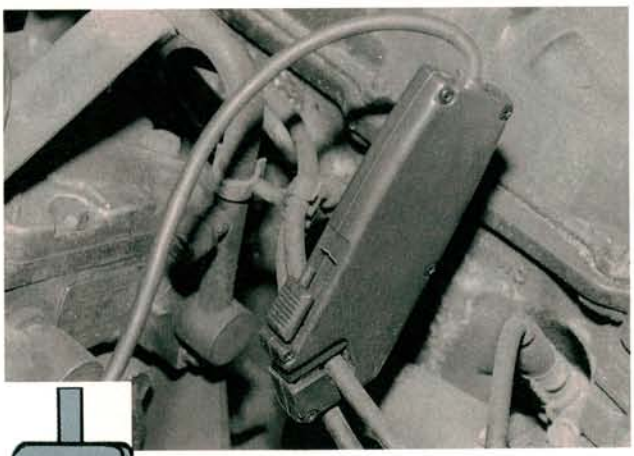
Fortunately, most lab scopes also have an external input terminal that can be used to synchronize the lab scope display. The signal information from the external input isn't displayed on the screen like the A and B channel inputs are. Instead, the scope uses the external input signal to decide "when" to display the signals from the other two channels. Control locations will vary from one scope to the next. On this scope, we moved the triggering source control to the EXT position and pulled the LEVEL control knob out for automatic triggering operation.



3

This is where Wayne's tip comes into play. We know we need an external trigger to "synch" our scope signal display, but how are we going to get the signal from the engine? An inductive RPM pickup is available for use with Fluke Automotive Meters. It can also be purchased separately. The RPM pickup has two banana plugs with standard spacing that are used to attach the pickup to the Fluke meter. With a dual binding post to BNC adapter from Radio Shack (P/N 274-715), we can attach the inductive pickup leads to the scope's BNC style external trigger terminal.



4

The timing and duration of many engine control signals change when engine RPM changes. The following examples are signals that would be easier to follow if they were synched to the engine RPM using the number one plug wire:

- Distributor pickup or Hall sender to ECU or distributor module
- Crank or cam position sensor to ECU
- ECU trigger signal to coil power transistor
- ECU trigger signal to injectors.

Synching these signals also makes it easier to determine if they are occurring when they should.

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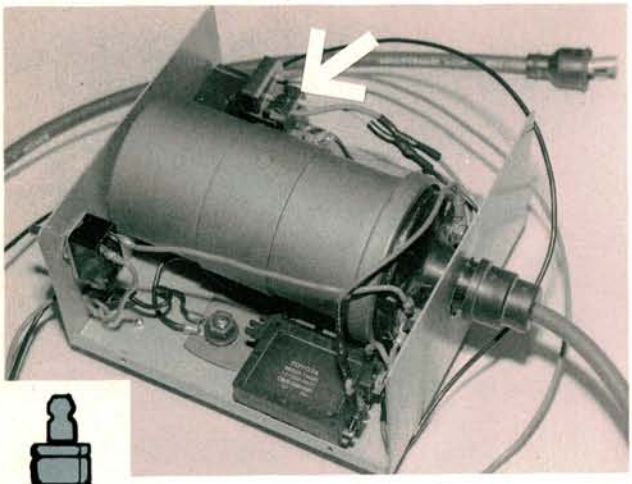
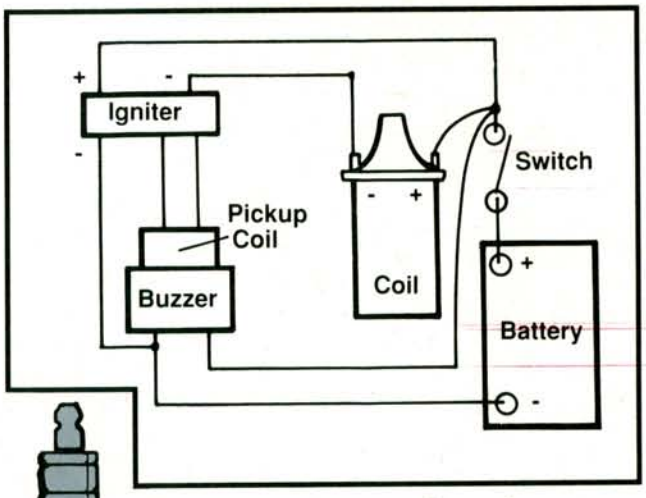
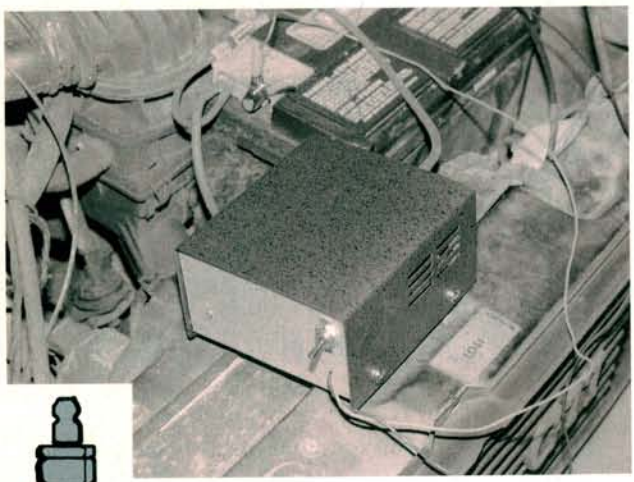
Joe's Portable Ignition



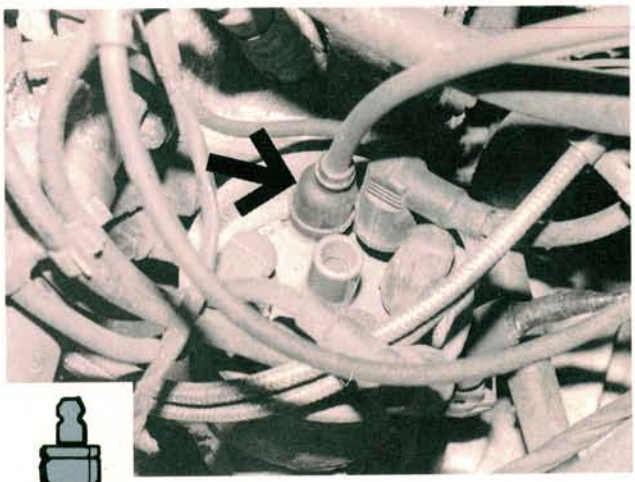
Joe Lash signed his letter "Cheap" Joe Lash. We got the impression that he doesn't like to spend money if he doesn't have to. His low cost portable ignition unit can be constructed using discarded ignition components and some parts from the electronics store. A key warning buzzer (arrow) gives the input signal to the pickup coil. The buzzer's high frequency makes the igniter fire the ignition coil very rapidly. The portable ignition isn't timed to the engine, so it's up to the cap and rotor to send the spark to the right place at the right time.



This wiring diagram shows how everything fits together. The Nissan Stanza igniter Joe used doesn't have a separate pickup coil. The key warning buzzer will trigger the Stanza igniter as long as they share the same ground. The Toyota igniter we used has a separate pickup coil. We attached the pickup coil to the igniter terminals, then positioned the pickup coil near the key buzzer. The weak inductive current given off by the oscillating buzzer tricks the igniter into firing the coil.



Let's try our portable ignition on a no-start. Remove and ground the engine's coil wire. Install the portable ignition coil wire, then hook up the battery leads. Switch on the portable unit, then crank the engine. The portable unit coil fires very rapidly, so there's very little time for coil saturation and some of the spark may end up spilling over into adjacent cylinders. This may cause the engine to run less smoothly than it normally would. At least you won't have to push the car into the shop.



The portable ignition also will clear out flooded engines. Disconnect one of the plug wires from the distributor and plug the wire into the portable ignition. Turn on the portable ignition to clear the flooded cylinder, then move on to the next cylinder. If you need a cheap worm source for a fishing trip, attach the coil wire to a screwdriver and stick it in the ground. Run another wire from the battery ground to a second screwdriver stuck in the ground a few feet from the first. Throw the switch and the worms will jump out of the ground.

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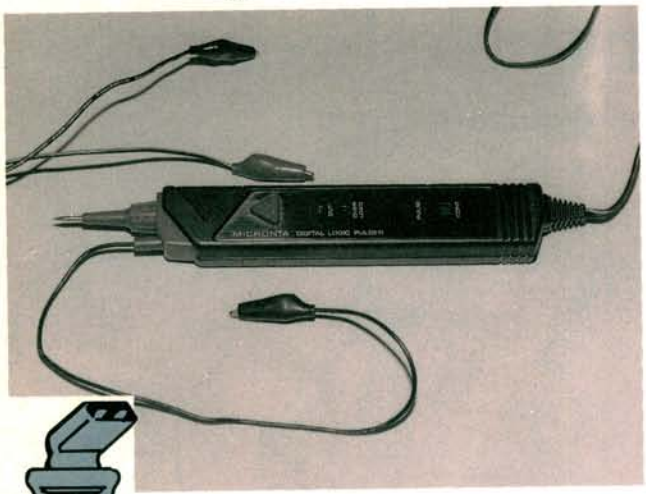
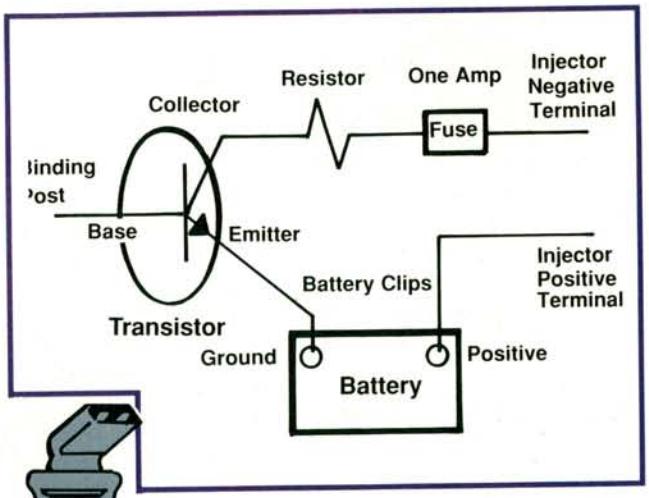
Chris's Logic Pulser Booster



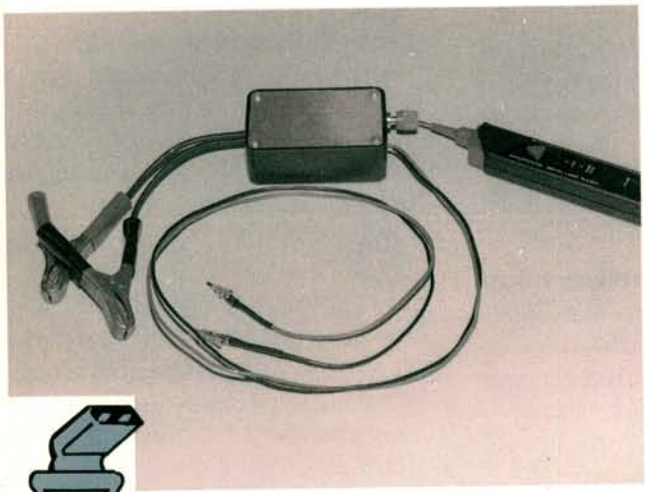
1

Back in November of last year, we ran a Tech Tip from a reader describing how to use a logic pulser (shown here) to trigger the injectors during fuel system testing. The logic pulser's square wave signal simulates the signals from the ECU to the injectors. We neglected to point out that the square wave signal emitted by most logic pulsers doesn't have the necessary amperage to satisfy the power requirements of most injectors, so the injector may not open. Chris Cross sent us plans for a trigger device to use with the logic pulser to test injectors.



2

This simple wiring diagram describes the construction of the booster. A transistor from Radio Shack (P/N 276-2020) acts as a switching device for the ground supply to the injector. The 10 ohm 1 watt resistor acts as a dropping resistor to protect injectors that normally operate at lower voltages. The inline fuse protects the logic pulser in case the injector is shorted. The positive battery lead isn't needed by the booster and passes straight through to the positive injector terminal.



3

We mounted everything in a small project box. Attach the logic pulser to the red binding post at the end of the project box. Attach the heavy battery leads to the car battery, then locate the injector connectors in the wiring harness. We soldered micro alligator clips to the injector trigger power supply leads. Substitute a Bosch style harness connector for a solid connection if you're attaching the injector trigger to Bosch style injectors. Make sure the trigger wiring is properly connected to the injector before proceeding.

4

Our Radio Shack logic pulser has single and continuous modes. The single pulse mode doesn't last long enough to trigger the injector. In continuous mode, we could both hear and see the operation of the injector on this single point injection system. On multipoint systems, the logic pulser can be used to trigger individual injectors for a fuel delivery comparison. Pressurize the fuel system, then trigger the injector for five pulser flashes. Note the drop in fuel pressure, then repressurize the fuel system and repeat the process on the remaining injectors.